ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

FOR GOD AND COUNTRY

WORKSHEET-27(CLASS-12)

TOPIC- CHEMICAL KINETICS

SUBTOPIC- RATE KINETICS AND ACTIVATION ENERGY **SUBJECT – CHEMISTRY**

DURATION – 30 mins **F.M. - 15**

DATE -23.06.20

1.1 According to Maxwell Boltzmann distribution of energy, _____

(a) The fraction of molecules with most probable kinetic energy decreases at higher temperatures.
(b) The fraction of molecules with most probable kinetic energy increases at higher temperatures.
(c) Most probable kinetic energy increases at higher temperatures.
(d) Most probable kinetic energy decreases at higher temperatures.

Ans. a and d

1.2 At high pressure the following reaction is zero order.

$$2NH_3(g) \xrightarrow[\text{Platinum catalyst}]{1130\ K} N_2(g) + 3H_2(g)$$

Which of the following options are correct for this reaction?

(a) Rate of reaction = Rate constant
(b) Rate of the reaction depends on concentration of ammonia.
(c) Rate of decomposition of ammonia will remain constant until ammonia disappears completely.
(d) Further increase in pressure will change the rate of reaction.

Ans. a

1.3Which of the following statements are applicable to a balanced chemical equation of an elementary reaction?

(a) Order is same as molecularity.
(b) Order is less than the molecularity.
(c) Order is greater than the molecularity.
(d) Molecularity can never be zero.

Ans. a and d

1.4 Rate law can be determined from balanced chemical equation if _____

(a) Reverse reaction is involved.
(b) It is an elementary reaction.

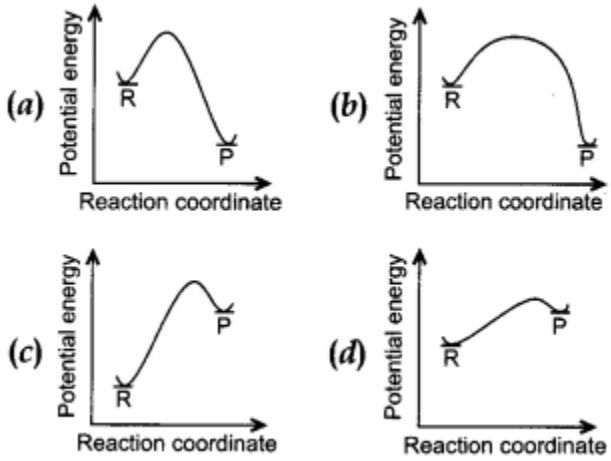
(c) It is a sequence of elementary reactions.
(d) Any of the reactants is in excess.
Ans.b

1.5 **Which of the following statements about the catalyst is true?**

(a) A catalyst accelerates the rate of reaction by bringing down the activation energy.
(b) A catalyst does not participate in reaction mechanism.
(c) A catalyst makes the reaction feasible by making ΔG more negative.
(d) A catalyst makes equilibrium constant more favourable for forward reaction.

Ans. a

1.6 An endothermic reaction with high activation energy for the forward reaction is given by the diagram.



Ans. c

1.7 Which among the following is a false statement?

a) Rate of zero order reaction is independent of initial concentration of reactant.
(b) Half-life of a third order reaction is inversely proportional to square of initial concentration of the reactant.
(c) Molecularity of a reaction may be zero or fraction.
(d) For a first order reaction, $t_{1/2} = \frac{0.693}{\mathrm{K}}$

Ans. c

1.8 **In the formation of $S0_2$ by contact process;**
$2SO_2 + O_2 \rightarrow 2SO_3$, the rate of reaction was measured as $\frac{-d[O_2]}{dt}$ = 2.5 × 10^{-4} mol $L^{-1}s^{-1}$.
The rate of formation of $S0_3$ will be-

(a) (-)5.0×10^{-4} mol $L^{-1}s^{-1}$
(b) (-)1.25×10^{-4} mol $L^{-1}s^{-1}$
(c) 3.75×10^{-4} mol $L^{-1}s^{-1}$
(d) 5.00×10^{-4} mol $L^{-1}s^{-1}$

Ans. d

1.9 What will be the fraction of molecules having energy equal to or greater than activation energy, E_a?

(a) K(b) A (c) $Ae^{-E_a/RT}$ (d) $e^{-E_a/RT}$

Ans. d

1.10A first order reaction is 50% completed in 1.26×10^{14} s. How much time would it take for 100% completion?

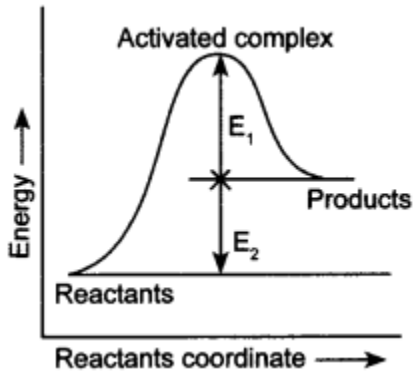
(a) 1.26×10^{15} s
(b) 2.52×10^{14} s
(c) 2.52×10^{28} s
(d) Infinite

Ans. d

1.11 For a chemical reaction A→B, it is found that the rate of reaction doubles when the concentration of A is increased four times. The order of reaction is-
(a) Two (b) One (c) Half (d) Zero
Ans. c

1.12 Consider Figure and select the correct option.

(a) Activation energy of forward read ion is $E_1 + E_2$ and product is less stable than reactant.
(b) Activation energy of forward reaction is $E_1 + E_2$ and product is more stable than reactant.



(c) Activation energy of both forward and backward reaction is $E_1 + E_2$ and reactant is more stable than product.
(d) Activation energy of backward reaction is E_1 and product is more stable than reactant.

Ans. a

1.13 The half-life of the first order reaction having rate constant K = 1.7 x $10^{-5}s^{-1}$ is-

(a) 12.1 h(b) 9.7 h(c) 11.3 h(d) 1.8 h

Ans.c

1.14 In case of slow reaction, if the temperature is increased by 10 K, then point out the false statement?

a) Average K.E decreases b) Energy of activation decreases c) Threshold energy increases

d) Number of collisions, get multiplied

Ans.a

1.15For a reaction taking place in three steps,

The overall rate constant, $K=K_1.K_2/K_3$, If Ea_1, Ea_2 and Ea_3 are 40, 50 and 60KJmol-1. Then the overall rate Ea becomes-

a) 30 b) 40 c) 60 d) 50

Ans. a

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